Service innovation: Inward and outward related activities and cooperation mode

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A B S T R A C T

Knowledge of how customers co-create value, the way that suppliers and providers co-produce services, and how research and development centers and universities transfer technologies is becoming increasingly important to scholars' understanding of service innovation. This paper presents an analysis of the relationship between inward and outward innovation activities in service organizations and their modes of innovation, using network innovation premises and an extended innovation model. Empirical data from retail, health and education sector service organizations show the existence of a relationship between the degree of development of the inward innovation process and the degree of development of outward innovation activities. The majority of service organizations have innovation processes with an orientation toward customers and suppliers rather than other service network members, and leading service organizations follow a path that the literature defines as oriented toward the service value network. Findings lead to implications of how innovation managers could develop their internal innovation capacity to balance inward and outward activities properly.

1. Introduction

As services become more important for society and customers demand more complex and personalized solutions, researchers are dedicating more time to understanding their innovation processes. Service innovation and new service development processes are priorities for academic research (Karniouchina, Victorino, & Verma, 2005), innovation on the basis of network activity is an emerging theme (Tidd & Bessant, 2009), and service theory as a discipline is evolving from good-dominant logic to service-dominant logic, where customers co-create value through service (Vargo & Lusch, 2004). Since the service economy is growing and customers demand better value proposals and improved service, the innovation process is becoming essential to providing a timely response to the market with new or improved service solutions. Globalization and new information and communication technologies are pushing innovation processes to become more open, flexible, integrated, complex, multi-actor and network-oriented, in line with the pioneering perspective of fifth-generation innovation models (Rothwell, 1992).

Understanding how particular service characteristics (co-production and customer co-creation of value) define the innovation process, and how cooperating innovation activities involve co-producers, customers, suppliers and co-developers (universities and research centers) together with the service provider, could enhance the development of new or improved services (Karniouchina et al., 2005). The European Community Innovation Survey 2010 (Eurostat, 2011) reveals that 32.7% of organizations with 50 to 249 employees and innovation activities develop some type of cooperation for product and process innovation. Suppliers and customers are the agents that engage most heavily in cooperative innovation projects, followed by universities, consultants and research and development (R&D) centers. As innovation becomes more reliant on network activity, connect and develop models emerge as an improved and successful form of innovation processes (Huston & Sakkab, 2006; Lafley & Charan, 2008).

The objective of this paper is to analyze the relationship between inward and outward innovation service activities, and identify their cooperative mode of innovation. In times of open innovation, findings help shed light on the degree of balance between internal and external innovation activities, and capacities that service network members require.

Section two describes the theory and relevant literature regarding service, network, collaboration, and innovation models. Section three presents the framework to analyze inward and outward service innovation activities. Section four describes the empirical study. Section five presents the findings and section six offers the conclusions, along with limitations and managerial implications.

2. Theoretical review

Gadrey (1992, p. 19) defines service as, "the set of processing operations carried out by a service provider (B) on behalf of a client

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(A), in a medium (C) held by A, with the purpose to bring about a change of state in the medium C." With service-dominant logic, service is the fundamental basis of exchange. Service is the process of using one's competencies (knowledge and skills) for the benefit of another party, while goods act as distribution mechanisms for the provision of services. Furthermore, the customer is always a co-creator of value (Vargo, 2009; Vargo & Lusch, 2004).

A service system is a complex configuration of resources that interact in a non-linear way; a dynamic disposition of resources (people, technology, organizations and shared information) that creates and delivers value between service provider and customer (IfM & IBM, 2008). The development and use of information and communication technologies enables service organizations to expand the role that customers and suppliers play in the service system. In the unified theory of services (Froehle & Sampson, 2006), the concept of the bidirectional service supply chain considers an expanded role for customers, namely as suppliers of inputs more than labor co-producers. Bidirectional refers to the ways in which information, goods and people flow within the service process.

A network is a set of actors or nodes, and a set of ties of a specified type that link them. The ties interconnect through shared end points to form paths that indirectly link nodes that are missing direct ties between one another (Borgatti & Halgin, 2011). The degree of hierarchy, structure, content, functions, institutional form and styles of learning are network characteristics (Powell, 1990). Instead of a linear chain, services involve a complex network of customers, suppliers, universities and R&D centers, where the service provider plays a prominent role to satisfy customers' value demands. Organizations that develop a network of heterogeneous collaborative actors in line with their innovation strategies perform better in terms of turnover from new or improved products (Faems, van Looy, & Debackere, 2005).

2.1. Innovation models

Innovation is a multi-player game. As a process, innovation increasingly links organizations making use of wider networks (Tidd & Bessant, 2009). Linking services organizations through cooperative innovation activities means active participation in joint R&D, strategic alliances and other less formal collaborative organization arrangements, to develop innovation projects with other organizations. Cooperative innovation through a service network means people talking, sharing, building, and launching ideas that then crystallize into new or renewed services (Tether, 2002).

Innovation models have evolved in the past five decades. The first two generations represent innovation as linear, with a project orientation, on the basis of demand pull or technology push strategies. The third generation recognizes the value of interaction and feedback between different stages of the innovation process. More recently, fourth generations of innovation models show how organizations connect upstream with key suppliers and downstream with customers that are keen to gain an understanding of how knowledge, ideas and teamwork transform into success. Examples are the process-based model of innovation (Chiesa, Coughlan, & Voss, 1996), the pentathlon model (Goffin & Pfeiffer, 1999; Oke & Goffin, 2001), the TEMAGUIDE model (COTEC, 1999), the process of innovation management (Tidd & Bessant, 2009), and studies on how innovation processes take place in service organizations (COTEC, 2004; den Hertog, 2000; den Hertog, Van der Aa, & de Jong, 2010; Oke, 2007).

Tether and Tajar (2008) propose an innovation model using three dimensions: type of innovation (product or process), type of technology change (hard or social) and locus of innovation (internal or inter-organizational). The European Community Innovation Survey IV (Eurostat, 2004) identifies three modes of innovation: (i) product-oriented, more prevalent in high-tech manufacturing organizations; (ii) technological process-oriented, typical of low-tech manufacturing firms; and (iii) organizational cooperation-oriented, which prevails in service organizations where organizational innovation is the main innovation and cooperation with suppliers or customers is the main source of technology. In this context, the survey also reveals that the qualification and professionalism of the workforce is the main driver of innovation.

Fifth-generation innovation models comprise open-innovation models (Chesbrough, 2003) and the connect and develop model (Sakkab, 2002), which pays more attention to how the innovation process requires higher levels of integration and extensive networking to be more efficient.

2.2. Collaboration

In many service sectors, suppliers are an important source of technology and knowledge. R&D centers and universities develop technologies and play a fundamental role in the development of innovation projects, and suppliers link up in a so-called supplier-dominated trajectory (den Hertog & Bilderbeek, 1999; Pavitt, 1984). Collaboration in service organizations through strategic alliances or other distribution forms is important to stay competitive and innovative (O'Farrel & Wood, 1999).

Customers, particularly users, are always co-creators of value and their collaboration is a fundamental source of competitive advantage. The ability to integrate operant resources between organizations increases the ability to gain competitive advantage through innovation (Lusch, Vargo, & O'Brien, 2007; Vargo & Lusch, 2004). Customer participation mediates the relationship between technical and non-technical innovation capabilities and service quality (Ngo & O'Cass, 2013). Customer expenditures to create and modify consumer products become more important in relation to improving R&D internal outcomes (von Hippel, Ogawa, & De Jong, 2010). Each type of user has different levels of involvement throughout the innovation process. Requesting users have a greater involvement in the idea stage, lead users in development, and pioneering users in launching activities (Jespersen, 2010).

Exploitative-oriented collaboration, more associated with incremental innovation, supports the improvement and further development of existing technologies and products, while explorative-oriented collaboration, more closely related to radical innovation, has greater benefits for creating new technologies and products. Customers and suppliers tend to have a greater involvement in exploitation projects aiming to generate high levels of turnover stemming from improved products, while collaborations with universities and research organizations, typically more explorative, are more likely to focus on new products (Faems et al., 2005).

Finally, customer involvement in service innovation has a positive impact on technical quality and innovation speed. Working with customers, service innovation processes improve prototyping and beta testing activities (Ettlie & Rosenthal, 2011). Findings reveal that perceived technological turbulence has a positive impact on customer involvement in new service performance, independent of the stage of innovation process development (Carbonell, Rodriguez-Escudero, & Pujari, 2009).

3. Methodology

This research proposes a set of service network innovation premises, their application to an innovation model, and then presents the field work phase and the analysis of the findings. A broader view leads to the concept of the service value network as the set of activities in an extended process, where actors or nodes such as suppliers, universities and research centers, among others, that link together through a structural relationship, integrate resources through service. The concept of the service value network integrates dimensions of co-production and customer value co-creation through service in a spaghetti network form of innovation (Tidd & Bessant, 2009).

To ensure the smooth functioning of the business with an efficient innovation process, the service value network must comply with the following three service network innovation premises (SNIP).

SNIP1 Alignment. Service innovation demands that institutional forms are adequate and in alignment, customers demonstrate collaborative skills, and suppliers and service providers achieve high standards in services and products. In most economies, a service innovation project risks introducing an operational network misalignment if other service network members fail to meet the necessary standards.

SNIP2 Service provider with expanded responsibility, delivering services through a coproduction network; however, only the service provider is responsible for all outcomes. Expanded responsibility means that the service provider has a high degree of hierarchy and a central position in the service value network.

SNIP3 Customer value co-creation. The main function of customers is to co-create value in accordance with their cultural context. Co-developers, universities and R&D centers should consider customers' needs and insights in their innovation activities.

These premises lead to the following two research questions. (i) Does the service provider have a relationship with the degrees of development of internal and external innovation activities? (ii) Do leading service organizations employ an organizational-cooperation mode of innovation?

This research uses the TEMAGUIDE innovation model to evaluate the internal innovation process. This model analyzes the innovation processes from an organizational perspective and details how to measure the development of an innovation process through the study of activities and innovation techniques via five phases: scan (S), focus (F), resource (R), implement (I) and learn (Lr). Scan looks for signals about market opportunities and technology to prepare the organization for changes that could affect its future. Focus consists of generating ideas to provide alternatives to improve the organization's competitiveness. Resource implies developing skills and competencies required by innovation projects. Implement refers to executing the innovation projects. Finally, learn consists of reviewing differences between objectives and results from every project to increase knowledge and improve the innovation process.

The set of service network innovation premises (SNIP1, SNIP2 and SNIP3) lead to the analysis of collaboration activities between the service provider and other members of the service value network, through a new group of variables belonging to the phase of Cooperation (Co) (Fig. 1).

Analysis of the relationship between inward and outward innovation activities calls for the definition of two indices: Inward Innovation Process Development Index (IIPDI) and Outward Innovation Activities Development Index (OIADI).

3.1. Inward Innovation Process Development Index (IIPDI)

The inward innovation process development index is the sum of the mean values for each of five phases from the TEMAGUIDE model, where the outcome of each phase is an average of values for each of its variables:

$$\text{IIPDI} = \frac{\sum_{i=1}^{5} \overline{F}_i}{5}, \quad \text{where} \quad \overline{F}_i = \frac{\sum_{j=1}^{n} v_{ij}}{n}; n = \text{number of inward variables.}$$

Each variable uses a five-point Likert scale, and the maximum value of the IIPDI is 5.

3.2. Outward Innovation Activities Development Index (OIADI)

The outward innovation activities development index is the average of values for each cooperation variables:

$$\text{OIADI} = \frac{\sum_{i=1}^{m} Co_i}{m}; m = \text{number of outward variables.}$$

Each variable (Co_i) uses a five-point Likert scale, and the maximum value of the OIADI is 5.

4. Empirical study and variables

The field experiment to determine both IIPDI and OIADI consists of using a research instrument called the service innovation survey, which involves the following steps: design and test of a draft from in-depth interviews with experts from each service sector, and correct specific questions according to any problems that arise. The survey includes a set of 47 questions with 35 variables. A beta test confirms functionality, use and usefulness of the questionnaire.

To analyze outward innovation activities, the survey includes a set of seven questions that look into how the service provider's innovation activities relate to customers, suppliers, universities and R&D centers. The set of cooperation activities includes collaboration, orientation and use of innovation techniques that, through the innovation process, management utilizes jointly with suppliers, customers, universities and R&D centers.

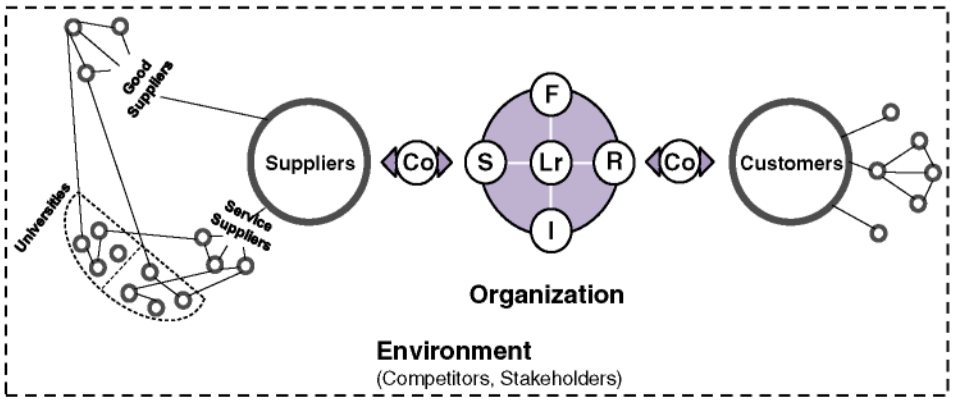

Fig. 1. Service network innovation model.

Table 1
Service innovation's survey variables.

Type	Phase	Variable	Description
Inward innovation activities	Scan	S1	Scan activities
		S2	Information source activities
		S3	Market intelligence activities
		S4	Scan techniques
	Focus	F1	Focus activities
		F2	Idea selection activities
		F3	Idea creation techniques
		F4	Idea selection techniques
	Resource	R1	Competency building activities
		R2	Technology acquisition activities
		R3	Internal competencies development activities
		R4	Intellectual property rights activities
	Implement	I1	Project planning activities
		I2	Project planning techniques
		I3	Project planning frequency
		I4	Product/service innovation activities
		I5	Product/service innovation techniques
		I6	Product/service innovation frequency
		I7	Process innovation activities
		I8	Process innovation techniques
		I9	Process innovation frequency
		I10	Market innovation activities
		I11	Market innovation techniques
		I12	Market innovation frequency
		I13	Organizational innovation activities
		I14	Organizational innovation frequency
	Learn	Lr1	Organizational learning activities
		Lr2	Organizational learning techniques
Outward innovation activities	Cooperation	Co1	Customers' cooperation activities
		Co2	Suppliers' cooperation activities
		Co3	Orientation toward service network
		Co4	Orientation toward suppliers
		Co5	Orientation toward customers
		Co6	Orientation toward universities and R&D centers
		Co7	Cooperation techniques

Table 1 shows the set of variables. Phases for inward innovation variables come from the TEMAGUIDE innovation model, while outward innovation variables belong to the phase of cooperation that analyzes to what extent the innovation process takes place through the service value network.

The survey covers senior managers, managers with extensive knowledge about innovation processes and managers who are able to respond or who know people who could answer these questions. This process is a standard practice for studies in the field of innovation (O'Regan, Ghobadian, & Sims, 2006). The survey covers the retail, healthcare and education sectors. The choice of sectors owes to the development of information and communication technologies in these sectors' innovation cycles and the sectors' high impact on the population's quality of life. The heterogeneity of each sector shifts the focus to specific subsectors considered innovation benchmarks: chain stores in the retail sector, high-ranking private hospitals in the healthcare sector, and universities with engineering faculties in the education sector.

The study population comprises 124 organizations: 71 chain stores, 16 high-ranking private hospitals and 37 universities with engineering faculties. The response rate is 24%: 12 chain stores, eight high-ranking hospitals and 10 universities with engineering faculties. Experts consider these responses relevant to show the best innovation reality for these sectors in Venezuela.

Cronbach's alpha and the corrected Pearson's coefficient provide measures of reliability for the values and scales. For all variables, the Pearson's coefficient is higher than the minimum requirement of 0.362, Cronbach's alpha is 0.954 and the standardized Cronbach's alpha is 0.957, both close to 1, thus confirming the survey's internal consistency.

5. Results

5.1. Internal and external innovation activities

The first research question focuses on the relationship between the degrees of development of internal and external innovation activities. A linear regression analysis between IIPDI and OIADI ($R^2 = .73$ and significant t-test result $t = 8.73 > tc = 2.05$ for $n = 30$ and $\alpha = .05$) confirms that service organizations with a higher degree of development of internal innovation activities have a higher degree of development of outward innovation activities (Fig. 2).

Fig. 3 shows the scatter matrix, or the IIPDI–OIADI balance, which aids with the understanding of the relationship between inward and outward innovation activities. The diagonal line represents a service innovation process with an equal degree of development for both inward and outward innovation activities. When an organization is above the diagonal, outward innovation activities have higher degrees of development than inward innovation activities. The organization's position in the matrix allows innovation managers to check that the mix of outward and inward innovation activities corresponds to the overall innovation strategy. Most of the service organizations in the survey (77%) are above the diagonal, showing that they orient their inward innovation activities toward other service network members.

5.2. Cooperative mode of innovation

The second research question validates whether leading service organizations employ the organizational-cooperation mode of innovation. A cluster analysis determines the leading group using squared Euclidean distance as the proximity method and centroid clustering for the hierarchical classification. Cluster analysis is a multivariable technique that groups variables such that, on the one hand, objects belonging to the same group are very similar to each other and, on the other, objects belonging to different groups have different behaviors with respect to these variables. The cluster analysis determines that the leading group consists of five organizations; three from retail, one from healthcare and one from the education sector.

To evaluate the degree to which a service provider's innovation activities have an orientation toward suppliers, customers, universities and R&D centers, an outward orientation index assesses the degree to which an organization orients their innovation activities toward external agents. The outward innovation index is the average of variables Co4 (orientation toward suppliers), Co5 (orientation toward customers) and Co6 (orientation toward universities and R&D centers). Table 2 shows that leading organizations strongly orient the development of their innovation processes toward suppliers, customers, universities and R&D centers. Also, outward innovation activities lean more toward suppliers and customers, and they follow a path defined as

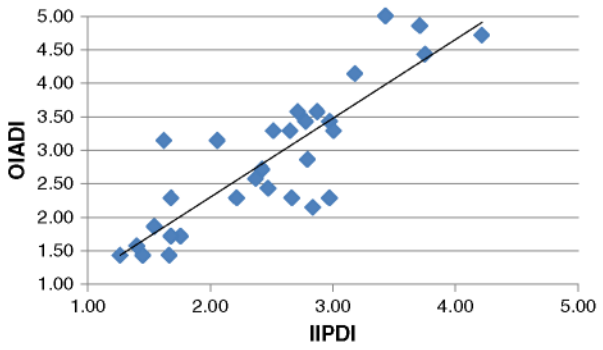

Fig. 2. Regression analysis between IIPDI and OIADI.

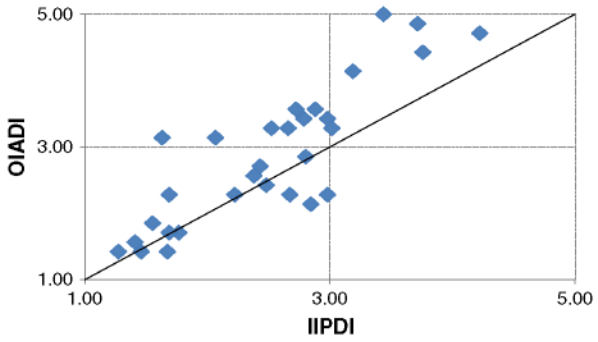

Fig. 3. IIPDI–OIADI balance matrix.

oriented toward the service value network, in which the service provider develops service innovation projects with co-producers (suppliers and customers) and co-developers (universities and R&D centers).

Results show that leading organizations are more active in developing technological and non-technological innovations, in contrast to the remaining organizations. Table 2 also shows that all types of innovation have similar activity levels for each organizational segment.

Leading organizations have the highest level of personnel training activities associated with their innovation processes, according to the variable R3 (internal competencies development activities) with a value of 4.4.

Finally, findings imply that leading organizations overmatch characteristics of the organizational-cooperation mode of innovation. First, leading organizations have a clear tendency to orient their innovation processes toward suppliers, customers, universities and R&D centers. Second, staff training is a key activity in the development of innovation processes. Third, leading organizations have similar orientations toward different types of innovation. Consequently, leading organizations show a general cooperation mode of innovation, without preference for any specific type of innovation but tending toward the service value network.

6. Conclusions

As customers co-create value and service organizations gain more knowledge from suppliers, universities and R&D centers, connections between inward and outward innovation activities tend to strengthen and borders become more diffuse. This research is an interesting contribution to understanding the innovation process in service organizations. First, alignment, service provider expanded responsibility and customer value co-creation, as premises of service network innovation, shifts the analysis of innovation processes to a network view. Second, the study confirms the relationship between the degree of development of outward and inward innovation activities. Most of the service organizations have a higher outward degree of development of innovation when compared to their inward degree of development of innovation, showing an innovation process with a greater orientation toward customers and suppliers than other service network members (universities and R&D centers). Third, findings show that leading service organizations engage in a general cooperation mode of innovation, instead of an organizational-cooperation mode. In this mode of innovation, organizations orient their innovation processes toward suppliers, customers, universities and R&D centers without a preference for any specific type of innovation.

The conclusions also have managerial implications. When building the service innovation process, managers should seek an appropriate balance between the development of internal and external innovation activities, and capabilities through the service value network, to improve managers' know-how in applying innovation management methodologies and networking among service network members.

To avoid baseless generalizations, some limitations in the study restrict the findings of this research to their present context. Small sample size, number of service sectors and number of variables to assess service network innovation process mean that extrapolations may be invalid. Future research should explore how service network members develop each type of innovation (exploitative or explorative), and which form of innovation makes up their outward service innovation activities.

Table 2
Evaluation of innovation orientation and innovation type.

Orientation of innovation				
Organizational segment	Suppliers (Co4)	Clients (Co5)	Universities and R&D centers (Co6)	Average (Co4 + Co5 + Co6) / 3
Leading organizations	5.00	4.60	4.00	4.53
Remaining organizations	2.80	3.16	2.44	2.80
Total sample	3.17	3.40	2.70	3.09
	Type of innovation			
Organizational segment	Product or service (I4)		Process (I7)	Organizational (I10 & I13)
Leading organizations	3.00		3.00	3.20
Remaining organizations	1.64		1.88	1.50
Total sample	1.87		2.07	1.78

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